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appears that he used the very low temperature of 16°7 C. He finds that some seeds germinate much better in darkness than in light, for example, *Leucojum vernum*, *Asphodelus*, *Anthericus ramosus*, *Paris Smilacina*, *Polygonatum*, and *Veratrum*. *Phacelia* and *Nemophila insignis* germinate very slowly and sparingly in white light, more rapidly and abundantly in darkness, and very quickly and completely in blue light. KINZEL finds the favorable action of the light is not due to the actinic rays, for in many cases the rays exerting least actinic power are most effective in bringing about germination.—WILLIAM CROCKER.

Heterotypic mitosis in *Lilium*.—In a paper on the prophase of the heterotypic mitosis in the embryo sac mother cell, MOTTIER³³ describes the effect of fixing fluids and traces the early development of the heterotypic spirem in the megaspore mother cell of *Lilium Martagon* and *L. candidum*. The following conclusions are reached: (1) Previous to synapsis a single nuclear thread is developed, which in many cases can be demonstrated clearly as a definite spirem with somewhat regular and uniform chromatin granules. (2) There is no union side by side of two distinct chromatin spirems before or during synapsis, which is regarded as a normal process, but the greater compactness of the balled-up mass may be due partly to the reagent. (3) The hollow spirem following synapsis is double, due to the longitudinal fission, which as a rule becomes completely obscured before the transverse segmentation. (4) The first mitosis, therefore, separates transversely the two members of the bivalent chromosome. (5) The heterotypic mitosis is thus a reduction division, and if one chromosome differs from another potentially or otherwise, it is also qualitative. (6) In the presynaptic phase, that the chromatin may appear as large clumps instead of smaller and uniform granules has been suggested as being due in part to the fixing fluids, the finer and more uniform granules being nearer the normal. The wide divergence of the halves of the chromatin thread appearing occasionally in the stage of the hollow spirem may also be due in part to the reagent.—SHIGÉO YAMANOUCHI.

Germination of zygotes of *Spirogyra*.—The germination of zygotes of *Spirogyra jugalis* Ktze. has been studied by KARSTEN.³⁴ The germinating stage of the zygotes was obtained during November and December, and some of the cytological results are as follows: Two nuclei in the zygote are in close contact, the membranes between them staining faintly and evidently becoming dissolved. In the fusion nucleus two nucleoli derived from two gamete nuclei are seen for a time, but they finally fuse. The interior of the fusion nucleolus is vacuolized, but the outer portion remains and stains deeply. At the first division of the nucleus the synaptic stage is represented by a peculiar and irregular massing of the nucleolar membrane and a peculiar elongated condition of the nucleolus, which is now

33 MOTTIER, DAVID M., On the prophases of the heterotypic mitosis in the embryo sac, mother cell of *Lilium*. *Annals of Botany* 23:343-353. *pl.* 23. 1909.

34 KARSTEN, G., Die Entwicklung der Zygoten von *Spirogyra jugalis* Ktze. *Flora* 99:1-11. *pl.* I. 1908.